



Drive Clean Guide

Emission standards, emissions test methods
and technical information relating to
Ontario Regulation 361/98 as amended



For the air we breathe.



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**Drive Clean Office
Ontario Ministry of the Environment**

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Introduction

The *Drive Clean Guide* has been prepared for reference by automotive specialists including emission inspectors and repair technicians, and other people with a technical interest in Ontario's Drive Clean, a program to reduce smog causing emissions from cars, trucks and buses.

This document contains details of specific methods for measuring vehicle emissions, as well as the standards vehicles must meet to pass a Drive Clean test.

The various Drive Clean requirements are based on Ontario Regulation 361/98, as amended, made under the authority of the *Environmental Protection Act*. In this document we will refer to O.R. 361/98, as amended, as the "Regulation."

Regulations under the *Highway Traffic Act* specify which vehicles must pass an emissions test for registration renewal (every two years) or on change of ownership when a safety certificate is required. These provisions are found in Regulation 628, R.R.O. 1990, as amended [notably O.R. 654/98], and they touch on such things as model years affected, test frequency and included geographic areas. In this document, we will refer to this as the "HTA Regulation".

The *Drive Clean Guide* is intended to supplement Ontario Regulation 361/98 and provide specific information about its requirements. This document is not a regulation, nor is it an official document of the Legislature of Ontario.

The *Drive Clean Guide* is intended to accompany O. Reg. 361/98 so as to provide ready access to test procedures and emission standards called up by the Regulation.

The remaining parts of the document have been produced for information purposes only.

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1. Definitions

The Regulation contains definitions of relevant terms. The following are additional definitions of terms used in this Guide:

CO means carbon monoxide

ETW means Equivalent Test Weight, the weight in pounds specified by the manufacturer as the representative vehicle weight for emissions testing by the ASM 2525 dynamometer test

Director means the person designated under the *Environmental Protection Act* by the Minister of the Environment to make decisions and perform other functions with respect to a regulation

Full Duration Cutpoints means that standards apply during the full 240 seconds elapsed time of the IM240 (laboratory grade) and IG240 (instrument grade) transient dynamometer tests

GVWR stands for the gross vehicle weight rating and means the value specified by the vehicle manufacturer as the loaded weight of a single vehicle

HC means hydrocarbons

HDV means heavy duty vehicle (GVWR greater than 4,500 kg)

LDV means light duty vehicle (GVWR 4,500 kg or less)

LVW means loaded vehicle weight (the weight of the vehicle plus 300 pounds [136 kilograms])

NO_x means nitrogen oxides

On Board Diagnostic System means a system which monitors and stores information on the functioning of emission control equipment installed in or on the vehicle

Phase 2 Cutpoints means that standards apply during the 90 to 240 seconds elapsed time segment during the IM240 and IG240 tests

Tier 1 means motor vehicles manufactured to meet Tier 1 emission standards as specified by the United States Environmental Protection Agency (see the *Canada Gazette*, Part II, Vol. 131, No. 17, 20/08/97, page 2412, paragraph 1)

USEPA means the United States Environmental Protection Agency

VCW means vehicle curb weight, which is the weight of the vehicle with fuel tank(s) full and all necessary components mounted (but without passengers or luggage)

The Regulation provides certain special rules for determining the “model year” of a grey market vehicle, hot rod, kit car or rebuilt car.

2. Testing motor vehicles with respect to air emissions

The Regulation contains the following information and provisions:

- (1) Training requirements for a person authorized to determine compliance with the emission standards set out in this document. This person is certified as a Drive Clean Inspector.
- (2) Facility requirements for accreditation as an Ontario Drive Clean testing facility.
- (3) Provision for provincial officers or police officers to determine compliance with the emission standards at any location.
- (4) The Director may permit a person to deliberately alter a vehicle to assess the quality of an Ontario Drive Clean facility and the competence of staff at the facility.

3. Application

The provisions of the Regulation apply as follows:

- (1) Application of the requirements respecting visible emissions to every motor vehicle operating in Ontario.
- (2) Application of the entire regulation to every motor vehicle operating in Ontario for which a permit under the *Highway Traffic Act* is in effect.
- (3) Application of the entire Regulation to every van, truck or bus operating in Ontario with a GVWR greater than 4,500 kilograms. This includes out of province vehicles. Provisions in the Regulation relating exclusively to light duty vehicles are not pertinent.

4. Emission control equipment for kit cars, rebuilt cars and hot rods

The Regulation contains the following provisions concerning kit cars, rebuilt cars and hot rods:

- (1) Requirements for pollution control equipment on kit cars or rebuilt cars registered in Ontario.
- (2) Requirements for hot rods to meet emission control standards and have pollution control equipment attached.

5. Catalytic Converters

The Regulation contains the following provisions concerning catalytic converters:

- (1) Prohibition on using leaded gasoline as a fuel to operate a motor vehicle manufactured with a catalytic converter.
- (2) Prohibition on operating a motor vehicle with a catalytic converter if leaded gasoline has been used.
- (3) The prohibition in section 22(3) of the Act against removing equipment, including the catalytic converter, except to immediately repair or replace it, is augmented by a prohibition on routing exhaust gases around the catalytic converter.
- (4) Prohibition on operating a motor vehicle manufactured with a catalytic converter if the catalytic converter is not maintained or installed so that it functions as intended.

6. Visible emissions

The Regulation contains the following provisions concerning visible emissions:

- (1) Prohibition on operating a light duty vehicle if there is a visible emission for a specified period of time.
- (2) Prohibition on operating a heavy duty vehicle if there is a visible emission for a specified period of time.

6.1 and 7. Emission control systems or devices

The Regulation contains the following provisions concerning emission control systems or devices:

- Prescribes satisfactory replacements for emission control systems, devices, or parts.
- Prohibition on operating a motor vehicle manufactured with pollution control equipment if the equipment is not properly maintained or not kept installed or not functioning as intended.
- Prohibition, starting in 2001, on operating a light duty motor vehicle of model year after 1997 when the on board diagnostic system is displaying or storing a fault code related to emissions. A fault code indicates the improper functioning of the emission control system.

8. Two speed idle test

Gasoline fuelled light vehicles (and other fuels except diesel)

Maximum emission standards for the preconditioned two speed idle test are provided in Table 8.

The procedure to be used is the preconditioned two speed idle test set out in the USEPA publication EPA-AA-TSS-I/M-90-3 January 1991 – *Recommended I/M Short Test Procedures for the 1990's: Six Alternatives*.

A test may be used that the Director considers equivalent.

**Table 8: Maximum Emission Standards
two speed idle test*
gasoline fuelled light vehicles
(And other fuels except diesel)**

Model year and GVWR	HC (ppm) by volume	CO (%) by volume	Visible emissions (seconds in any one-minute period)
For vehicles up to 3855 kg GVWR:			
1998 & later	150	0.7	5
1988-97	200	1	5
1980-87	300	1.5	5
1975-79	400	2.5	5
1970-74	500	4	5
1969 and earlier	600	5	5
For vehicles over 3855 kg GVWR but not over 4,500 kg GVWR:			
1998 & later	200	1	5
1988-97	220	1.2	5
1980-87	300	3	5
1975-79	400	4	5
1970-74	800	6.5	5
1969 and earlier	1000	8	5

* Emission standards for both idle test and 2500 RPM test

9. Dynamometer test

Gasoline fuelled light vehicles (and other fuels except diesel)

The following two dynamometer tests are used in the program:

- ASM 2525 Dynamometer Test;
- Transient Dynamometer Test.

The former will be used in the very early stages of the program and will then be replaced by the latter.

ASM 2525 Dynamometer Test

If a motor vehicle is tested for compliance with the maximum emission standards appearing in Tables 9-HC, 9-CO, and 9-NOX, using the Table 9-KEY below, the procedure to be used is:

- ASM 2525 Dynamometer Test (acceleration simulation mode test) as set out in the USEPA publication EPA-AA-RSPD-96-2 – *Acceleration Simulation Mode Test Procedures, Emission Standards, Quality Control Requirements, and Equipment Specifications, Technical Guidance, Attachment B, July 1996.*

Key to the Tables

Table 9-KEY below indicates where to find the appropriate maximum emission standards from the three “look up” tables. These emission standards are installed in the software associated with the dynamometer test equipment, to be referenced automatically by the computer system, not manually.

For light duty passenger vehicles and two classes of light duty trucks (distinguished by GVWR), a column number is specified for each group of model years and each of the three emissions of interest (hydrocarbons, carbon monoxide, and oxides of nitrogen). The column number is used to identify the emission standards in the table specified under each of the three emission headings. The applicable emission standard is found in the indicated column, opposite the Equivalent Test Weight, specified by the manufacturer, for the motor vehicle in question. For example, a light duty passenger vehicle of model year 1993 and equivalent test weight of 2125 lb has a maximum emission of carbon monoxide specified as 0.66 percent.

Table 9-key: key to tables 9-HC, 9-CO, 9-NOx

ASM 2525 Dynamometer Test for Gasoline Fuelled Light Vehicles (and other fuels except diesel)

Light duty passenger vehicles (non diesel)			
<u>Model years</u>	<u>Hydrocarbons</u> Table 9-HC	<u>Carbon monoxide</u> Table 9-CO	<u>Nitrogen Oxides</u> Table 9-NOX
1996+	1	21	41
1992-1995	1	21	41
1988-1991	1	21	42
1984-1987	2	22	44
1980-1983	2	22	45
1968-1979	10	32	49
Light duty Trucks 1 (less than or equal to 6,000 pounds (2722 kg) GVWR – non diesel)			
<u>Model years</u>	<u>Hydrocarbons</u> Table 9-HC	<u>Carbon monoxide</u> Table 9-CO	<u>Nitrogen Oxides</u> Table 9-NOX
1996+	1	21	42
1992-1995	1	21	43
1988-1991	2	22	44
1984-1987	3	23	45
1980-1983	3	24	46
1968-1979	10	32	49
Light duty Trucks 2 (greater than 6,000 pounds (2722 kg) but less than or equal to 9,921 pounds (4,500 kg) (GVWR – non diesel)			
<u>Model years</u>	<u>Hydrocarbons</u> Table 9-HC	<u>Carbon monoxide</u> Table 9-CO	<u>Oxides of nitrogen</u> Table 9-NOX
1996+	2	22	46
1992-1995	2	22	47
1988-1991	3	23	48
1984-1987	4	24	48
1980-1983	6	25	49
1968-1979	10	32	49

Table 9-HC: Hydrocarbons (ppm - hexane equivalent)

ASM 2525 Dynamometer Test for Gasoline Fuelled Light Vehicles (and other fuels except diesel)

ETW (lb)	1	2	3	4	5	6	7	8	9	10	11	12	13
1750	136	216	249	282	315	364	381	397	447	694	761	828	1098
1875	129	205	236	266	297	344	359	375	421	653	717	780	1034
2000	123	194	223	252	281	325	339	354	398	616	676	736	975
2125	116	184	212	239	267	308	321	335	376	582	638	695	921
2250	111	175	201	227	253	292	305	318	357	551	604	658	872
2375	106	167	192	216	241	277	290	302	339	522	573	624	827
2500	101	160	183	206	230	264	276	288	322	496	544	593	786
2625	97	153	175	197	219	252	263	274	307	472	518	564	748
2750	93	147	168	189	210	241	252	262	294	451	495	539	714
2875	89	141	161	181	201	231	241	251	281	431	473	515	683
3000	86	136	155	174	194	222	232	241	270	413	453	493	654
3125	83	132	150	168	186	214	223	232	260	397	435	474	628
3250	80	127	145	162	180	206	215	224	250	382	419	456	604
3375	78	123	140	157	174	199	208	216	241	368	404	440	583
3500	76	120	136	152	169	193	201	209	234	355	390	424	563
3625	74	117	132	148	164	187	195	203	226	344	377	411	544
3750	72	114	129	144	159	182	189	197	220	333	365	398	527
3875	70	111	125	140	155	177	184	191	213	323	355	386	512
4000	68	108	122	137	151	172	179	186	208	314	345	375	497
4125	67	106	119	133	147	168	175	181	202	305	335	365	484
4250	65	103	117	130	143	164	170	177	197	297	326	355	471
4375	64	101	114	127	140	160	166	173	192	290	318	346	459
4500	63	99	112	124	137	156	162	169	188	282	310	337	447
4625	61	97	109	122	134	152	159	165	183	275	302	329	436
4750	60	95	107	119	131	149	155	161	179	269	295	321	425
4875	59	93	105	117	128	146	152	157	175	262	288	313	415
5000	58	92	103	114	126	143	148	154	171	256	281	305	405
5125	57	90	101	112	123	139	145	150	167	250	274	298	395
5250	56	88	99	110	120	136	142	147	163	244	267	291	386
5375	55	86	97	107	118	133	139	144	159	238	261	284	376
5500	54	85	95	105	115	130	136	141	156	232	255	277	367
5625	53	83	93	103	113	128	133	138	152	226	248	271	359
5750	52	82	91	101	111	125	130	135	149	221	243	264	350
5875	51	80	90	99	108	122	127	132	146	216	237	258	342
6000	50	79	88	97	106	120	124	129	143	211	232	252	334
6125	49	78	86	95	104	118	122	126	140	206	227	247	327
6250	48	76	85	94	102	115	120	124	137	202	222	242	320
6375	48	75	84	92	101	113	118	122	135	198	218	237	314
6500	47	74	83	91	99	112	116	120	133	195	214	233	309
6625	46	74	82	90	98	110	114	119	131	192	211	230	304
6750	46	73	81	89	97	109	113	117	129	190	209	227	301
6875	46	73	81	89	97	109	113	117	129	189	207	225	299
7000	46	72	80	88	96	108	112	116	128	188	207	225	298
7125	46	72	80	88	96	108	112	116	128	188	206	225	298
7250	46	72	80	88	96	108	112	116	128	188	206	225	298
7375	46	72	80	88	96	108	112	116	128	188	206	225	298
>7500	46	72	80	88	96	108	112	116	128	188	206	225	298

Table 9-CO: Carbon Monoxide (per cent carbon monoxide)

ASM 2525 Dynamometer Test for Gasoline Fuelled Light Vehicles (and other fuels except diesel)

ETW (lb)	21	22	23	24	25	26	27	28	29	30	31	32	33	34
1750	0.77	1.22	1.83	2.43	2.73	3.64	3.94	4.24	4.85	5.45	6.06	7.26	7.44	9.90
1875	0.73	1.16	1.72	2.29	2.58	3.43	3.71	4.00	4.57	5.14	5.70	6.84	7.05	9.90
2000	0.69	1.09	1.63	2.17	2.43	3.24	3.51	3.77	4.31	4.85	5.38	6.45	6.68	9.90
2125	0.66	1.04	1.54	2.05	2.30	3.06	3.32	3.57	4.08	4.58	5.09	6.10	6.34	9.66
2250	0.62	0.99	1.47	1.94	2.18	2.90	3.14	3.38	3.86	4.34	4.82	5.78	6.00	9.14
2375	0.59	0.94	1.39	1.85	2.07	2.76	2.98	3.21	3.66	4.12	4.57	5.48	5.69	8.67
2500	0.57	0.90	1.33	1.76	1.97	2.62	2.84	3.05	3.48	3.91	4.35	5.21	5.41	8.25
2625	0.54	0.86	1.27	1.68	1.88	2.50	2.70	2.91	3.32	3.73	4.14	4.96	5.15	7.85
2750	0.52	0.82	1.21	1.60	1.80	2.39	2.58	2.78	3.17	3.56	3.95	4.73	4.92	7.50
2875	0.50	0.79	1.16	1.54	1.72	2.29	2.47	2.66	3.03	3.41	3.78	4.53	4.70	7.17
3000	0.48	0.76	1.12	1.48	1.66	2.19	2.37	2.55	2.91	3.27	3.62	4.34	4.51	6.87
3125	0.46	0.73	1.08	1.42	1.59	2.11	2.28	2.45	2.79	3.14	3.48	4.17	4.33	6.60
3250	0.45	0.71	1.04	1.37	1.53	2.03	2.20	2.36	2.69	3.02	3.35	4.01	4.17	6.35
3375	0.43	0.69	1.00	1.32	1.48	1.96	2.12	2.28	2.60	2.91	3.23	3.87	4.02	6.13
3500	0.42	0.67	0.97	1.28	1.43	1.89	2.05	2.20	2.51	2.82	3.12	3.74	3.88	5.92
3625	0.41	0.65	0.94	1.24	1.39	1.84	1.98	2.13	2.43	2.73	3.02	3.62	3.76	5.73
3750	0.40	0.63	0.92	1.20	1.35	1.78	1.92	2.07	2.36	2.64	2.93	3.51	3.64	5.55
3875	0.39	0.61	0.89	1.17	1.31	1.73	1.87	2.01	2.29	2.57	2.85	3.40	3.54	5.39
4000	0.38	0.60	0.87	1.14	1.28	1.68	1.82	1.95	2.22	2.49	2.77	3.31	3.44	5.24
4125	0.37	0.58	0.85	1.11	1.24	1.64	1.77	1.90	2.16	2.43	2.69	3.22	3.34	5.09
4250	0.36	0.57	0.83	1.08	1.21	1.60	1.72	1.85	2.11	2.36	2.62	3.13	3.25	4.96
4375	0.35	0.56	0.81	1.06	1.18	1.56	1.68	1.81	2.06	2.31	2.55	3.05	3.17	4.83
4500	0.35	0.55	0.79	1.03	1.16	1.52	1.64	1.76	2.01	2.25	2.49	2.98	3.09	4.71
4625	0.34	0.54	0.77	1.01	1.13	1.48	1.60	1.72	1.96	2.19	2.43	2.90	3.02	4.60
4750	0.33	0.53	0.76	0.99	1.10	1.45	1.57	1.68	1.91	2.14	2.37	2.83	2.95	4.49
4875	0.33	0.52	0.74	0.97	1.08	1.42	1.53	1.64	1.87	2.09	2.32	2.77	2.87	4.38
5000	0.32	0.51	0.73	0.95	1.05	1.38	1.49	1.60	1.82	2.04	2.26	2.70	2.81	4.28
5125	0.31	0.50	0.71	0.92	1.03	1.35	1.46	1.57	1.78	2.00	2.21	2.64	2.74	4.18
5250	0.31	0.49	0.70	0.90	1.01	1.32	1.43	1.53	1.74	1.95	2.16	2.58	2.68	4.08
5375	0.30	0.48	0.68	0.89	0.99	1.29	1.39	1.50	1.70	1.90	2.11	2.51	2.61	3.98
5500	0.30	0.47	0.67	0.87	0.97	1.26	1.36	1.46	1.66	1.86	2.06	2.46	2.55	3.89
5625	0.29	0.46	0.65	0.85	0.94	1.24	1.33	1.43	1.62	1.82	2.01	2.40	2.49	3.80
5750	0.29	0.45	0.64	0.83	0.92	1.21	1.30	1.40	1.59	1.78	1.96	2.34	2.43	3.71
5875	0.28	0.44	0.63	0.81	0.91	1.18	1.27	1.37	1.55	1.74	1.92	2.29	2.38	3.62
6000	0.28	0.44	0.62	0.80	0.89	1.16	1.25	1.34	1.52	1.70	1.88	2.24	2.33	3.54
6125	0.27	0.43	0.61	0.78	0.87	1.13	1.22	1.31	1.49	1.66	1.84	2.19	2.28	3.47
6250	0.27	0.42	0.60	0.77	0.85	1.11	1.20	1.28	1.46	1.63	1.80	2.15	2.23	3.40
6375	0.26	0.42	0.59	0.76	0.84	1.09	1.18	1.26	1.43	1.60	1.77	2.11	2.19	3.34
6500	0.26	0.41	0.58	0.74	0.83	1.08	1.16	1.24	1.41	1.57	1.74	2.07	2.15	3.28
6625	0.26	0.41	0.57	0.73	0.82	1.06	1.14	1.23	1.39	1.55	1.72	2.04	2.12	3.23
6750	0.26	0.41	0.57	0.73	0.81	1.05	1.13	1.21	1.37	1.54	1.70	2.02	2.10	3.20
6875	0.25	0.40	0.56	0.72	0.80	1.04	1.12	1.20	1.36	1.52	1.68	2.00	2.08	3.17
7000	0.25	0.40	0.56	0.72	0.80	1.04	1.12	1.20	1.36	1.52	1.68	2.00	2.08	3.17
7125	0.25	0.40	0.56	0.72	0.80	1.04	1.12	1.20	1.36	1.52	1.68	2.00	2.08	3.17
7250	0.25	0.40	0.56	0.72	0.80	1.04	1.12	1.20	1.36	1.52	1.68	2.00	2.08	3.17
7375	0.25	0.40	0.56	0.72	0.80	1.04	1.12	1.20	1.36	1.52	1.68	2.00	2.08	3.17
≥7500	0.25	0.40	0.56	0.72	0.80	1.04	1.12	1.20	1.36	1.52	1.68	2.00	2.08	3.17

Table 9-NOX: Nitrogen Oxides (ppm nitric oxide)

ASM 2525 Dynamometer Test for Gasoline Fuelled Light Vehicles (and other fuels except diesel)

ETW (lb)	41	42	43	44	45	46	47	48	49	50	51
1750	1095	1642	2114	2587	3060	3532	4005	4950	4960	4980	4990
1875	1031	1547	1991	2435	2879	3323	3767	4655	4738	4906	4990
2000	973	1460	1877	2295	2713	3131	3548	4384	4535	4838	4990
2125	920	1380	1774	2167	2561	2955	3348	4136	4349	4776	4990
2250	871	1307	1678	2050	2422	2794	3165	3909	4179	4720	4990
2375	827	1240	1592	1943	2295	2646	2998	3701	4024	4668	4990
2500	786	1179	1512	1845	2179	2512	2845	3512	3881	4620	4990
2625	749	1123	1440	1756	2073	2389	2706	3339	3752	4577	4990
2750	715	1072	1374	1675	1976	2277	2579	3181	3579	4374	4772
2875	684	1026	1313	1601	1888	2175	2463	3037	3417	4176	4556
3000	656	984	1258	1533	1808	2082	2357	2906	3270	3996	4359
3125	630	945	1208	1471	1734	1997	2260	2787	3135	3832	4180
3250	607	910	1163	1415	1667	1920	2172	2677	3012	3681	4016
3375	585	878	1121	1363	1606	1849	2092	2577	2899	3544	3866
3500	566	848	1082	1316	1550	1784	2018	2486	2796	3418	3728
3625	547	821	1047	1273	1498	1724	1950	2401	2701	3302	3602
3750	531	796	1014	1233	1451	1669	1887	2323	2614	3195	3485
3875	515	773	984	1195	1407	1618	1829	2251	2533	3096	3377
4000	501	751	956	1161	1365	1570	1775	2184	2457	3003	3276
4125	487	731	930	1128	1327	1526	1724	2122	2387	2917	3182
4250	475	712	905	1098	1291	1484	1677	2063	2320	2836	3094
4375	463	694	882	1069	1257	1444	1632	2007	2258	2759	3010
4500	451	677	859	1042	1224	1406	1589	1953	2198	2686	2930
4625	440	661	838	1015	1193	1370	1548	1903	2140	2616	2854
4750	430	645	818	990	1163	1336	1508	1854	2085	2549	2780
4875	420	630	798	966	1134	1302	1470	1806	2032	2483	2709
5000	410	615	778	942	1106	1269	1433	1760	1980	2420	2640
5125	400	600	760	919	1078	1237	1397	1715	1930	2359	2573
5250	391	586	741	896	1051	1206	1362	1672	1881	2298	2507
5375	382	573	723	874	1025	1176	1327	1629	1833	2240	2443
5500	373	559	706	853	1000	1147	1294	1587	1786	2183	2381
5625	364	546	689	832	975	1118	1261	1547	1740	2127	2321
5750	356	534	673	812	951	1090	1230	1508	1697	2074	2262
5875	348	522	657	793	928	1064	1199	1471	1654	2022	2206
6000	340	510	642	774	906	1039	1171	1435	1614	1973	2152
6125	333	499	628	757	886	1015	1144	1401	1577	1927	2102
6250	326	489	615	741	867	993	1119	1371	1542	1884	2056
6375	320	480	604	727	850	973	1096	1343	1510	1846	2014
6500	315	473	593	714	835	956	1077	1318	1483	1813	1977
6625	311	466	585	704	823	941	1060	1298	1460	1785	1947
6750	307	461	578	696	813	931	1048	1283	1443	1764	1924
6875	305	458	574	691	807	924	1040	1273	1432	1750	1909
7000	305	457	573	689	805	921	1037	1269	1428	1745	1904
7125	305	457	573	689	805	921	1037	1269	1428	1745	1904
7250	305	457	573	689	805	921	1037	1269	1428	1745	1904
7375	305	457	573	689	805	921	1037	1269	1428	1745	1904
≥7500	305	457	573	689	805	921	1037	1269	1428	1745	1904

Transient Dynamometer Test

There are two sets of procedures that can be used if a motor vehicle is tested for compliance with the maximum emission standards appearing in Table 9-TR.

The first set of procedures including the transient dynamometer test is contained in the USEPA publication EPA-AA-RSPD-IM-96-1 June 1996 – High-Tech I/M Test Procedures, Emission Standards, Quality Control Requirements, and Equipment Specifications: IM240 and Functional Evaporative System Tests, Revised Technical Guidance Draft, June 1996.

An alternative set of test methods including the transient dynamometer test is provided by the New York State Department of Environmental Conservation and the Department of Motor Vehicles's Enhanced Inspection/Maintenance Program for the New York Metropolitan Area. The following documents contain the necessary information:

- *Technical Specifications* (January 1997)
- *Equipment Certification* (January 1997)
- Enhanced I/M Program Technical Specifications Software Design, Version 6.0 (September 1997)

A test may be used that the Director considers equivalent.

**Table 9-TR: Transient Dynamometer Test
for Gasoline Fuelled Light Vehicles (and other fuels except diesel)**

2001-2002: Use values in Columns 3 to 7 multiplied by 1.3;
 2003-2004: Use values in Columns 3 to 7 multiplied by 1.15;
 After 2004: Use values in Columns 3 to 7.

Vehicle class	Model year	Full duration cutpoints			Phase 2 cutpoints *	
		HC g/mi	CO g/mi	NO _x g/mi	HC g/mi	CO g/mi
1	2	3	4	5	6	7
Passenger vehicle	1968 to 1972	5.95	102	5.95	3.57	81.60
	1973 and 1974	5.95	102	5.10	3.57	81.60
	1975 and 1976	2.55	55.3	5.10	1.70	44.20
	1977 to 1979	2.55	55.3	3.40	1.70	44.20
	1980	2.55	38.3	2.98	1.60	30.60
	1981 to 1987	1.70	25.5	2.55	1.06	20.40
	1988 to 1990	0.68	12.8	1.70	0.43	10.20
	1991 to 1997 (Non Tier 1)	0.68	12.8	1.70	0.43	10.20
	1996 and after (Tier 1)	0.51	8.5	1.28	0.32	6.80
Light duty truck with a GVWR not exceeding 2700 kg.	1968 to 1972	5.95	102	5.95	3.83	81.60
	1973 and 1974	5.95	102	5.10	3.83	81.60
	1975 to 1978	3.40	68	5.10	2.13	54.40
	1979 to 1983	3.40	68	3.83	2.13	47.60
	1984 to 1987	1.70	51	3.83	1.06	35.70
	1988 to 1990	1.53	34	2.13	1.02	27.20
	1991 to 1997 (Non Tier 1)	1.53	34	2.13	1.02	27.20
	1996 and after [LVW ≤3750 lbs] (Tier 1)	0.51	8.5	1.28	0.32	6.80
	1996 and after [3750 lbs < LVW ≤5750 lbs] (Tier 1)	0.68	11.1	1.53	0.43	8.50

Vehicle class	Model year	Full duration cutpoints			Phase 2 cutpoints *	
		HC g/mi	CO g/mi	NO _x g/mi	HC g/mi	CO g/mi
1	2	3	4	5	6	7
Light duty truck with a GVWR exceeding 2700 kg.	1968 to 1972	5.95	102	5.95	3.83	81.60
	1973 and 1974	5.95	102	5.10	3.83	81.60
	1975 to 1978	3.40	68	5.10	2.13	54.40
	1979 to 1983	3.40	68	4.25	2.13	47.60
	1984 to 1987	1.70	51	4.25	1.06	35.70
	1988 to 1990	1.36	34	2.98	0.85	27.20
	1991 to 1997 (Non Tier 1)	1.36	34	2.98	0.85	27.20
	1996 and after [LVW ≤ 5750 lbs] (Tier 1)	0.68	11.1	1.53	0.43	8.50
	1996 and after [5750 lbs < LVW] (Tier 1)	0.68	12.8	1.70	0.43	10.20

* Note: Phase 2 cutpoints for NO_x = Full duration cutpoints

Additional Emission Standards (Evaporative System)

Dynamometer Test Gasoline Fuelled Light Vehicles (and other fuels except diesel)

Test procedures for the following evaporative system standards are contained in the USEPA publication EPA-AA-RSPD-IM-96-1 June 1996 – High-Tech I/M Test Procedures, Emission Standards, Quality Control Requirements, and Equipment Specifications: IM240 and Functional Evaporative System Tests, Revised Technical Guidance Draft, June 1996.

1. Fuel cap integrity standard

The vehicle's fuel cap must exhibit a pressure loss of less than six inches of water when a fuel cap integrity test is performed on the vehicle's evaporative system or must exhibit a flow rate of 60 cubic centimetres per minute or less of air at 30 inches of water column.

2. Purge standard

A flow exceeding one litre must be achieved when a purge test is performed on the vehicle's evaporative system.

3. Canister end pressure standard

When a canister end pressure test is performed on the vehicle's evaporative system, the vehicle must be able to maintain a pressure above eight inches of water:

- i. if the vehicle has a check valve in the purge line from the fuel tank to the canister, for at least two minutes after being pressurized to 28 inches of water (plus or minus 0.5 inches)
- or
- ii. for at least two minutes after being pressurized to 14 inches of water (plus or minus 0.5 inches)

4. Fuel inlet pressure standard

The vehicle must exhibit a pressure loss of six inches of water or less, subject to volume compensation, when a fuel inlet pressure test is performed on the vehicle's evaporative system.

Only the first of these standards (fuel cap integrity) applies immediately. All four of these standards apply in 2001 and afterwards.

Tests may be used that the Director considers equivalent.

10. Two speed idle test

Gasoline fuelled heavy vehicles (and other fuels except diesel)

This section applies only to heavy duty vehicles with a GVWR of greater than 4,500, but is otherwise equivalent to Section 8.

Maximum emission standards for the preconditioned two speed idle test are provided in Table 10.

The procedure to be used is the preconditioned two speed idle test procedure set out in the USEPA publication EPA-AA-TSS-I/M-90-3 January 1991 – *Recommended I/M Short Test Procedures for the 1990's: Six Alternatives*.

A test may be used that the Director considers equivalent.

**Table 10: Maximum emission standards
Two speed idle test
Gasoline Fuelled Heavy Vehicles
(and other fuels except diesel)**

Model year	HC (ppm) by volume	CO (%) by volume	Visible emissions (seconds in any one-minute period)
1998 & later	200	1	5
1988-97	220	1.2	5
1980-87	300	3	5
1975-79	400	4	5
1970-74	800	6.5	5
1969 and earlier	1000	8	5

11. Opacity test

Diesel fuelled light vehicles

The maximum emission standard for a passenger vehicle or a light duty truck (4,500 kg or less) operating on diesel fuel in the years set out in Column 1 of Table 11 is the maximum percentage opacity of the exhaust emissions shown opposite that year in Column 2 when the motor vehicle is tested using the opacity test for diesel fuelled light vehicles for that year, as indicated below or using a test that the Director considers equivalent.

Opacity test for diesel fuelled light vehicles for 1999 and following years

Vehicle inspection and preparation

Before conducting an emissions inspection, the engine must be at normal operating temperature and the vehicle and engine must be free of obvious mechanical faults that could affect the safety of persons conducting the test or possibly result in engine damage during the test. Vehicles with unsafe engines will not be tested until they are fixed.

The inspection sequence is as follows:

- all of the vehicle's accessories must be turned off. The parking brake must be set and the transmission in neutral or park
- inspect for fuel leaks and ensure the drive belt and cooling fan are in good condition
- verify that the engine is at normal operating temperature (under load for 15 minutes is best) and that the engine coolant and/or oil temperature is 160 degrees F (71 degrees C) or higher
- verify that an engine overheat is not imminent or likely during the test
- ensure sufficient levels of engine fluids (coolant, oil, etc.)
- listen for abnormal engine noise indicating possible mechanical faults

Dynamometer loaded mode opacity test

When the vehicle has been prepared, the following procedures apply:

- move vehicle onto dynamometer and stabilize. Set parking brake (if it acts on the non-driving wheels only) and wheel chocks
- precondition the vehicle on the dynamometer for 60 seconds at 50 kilometres/hour
- return to idle, set transmission in neutral and depress and release the accelerator rapidly three times (without over-revving) to clean out the exhaust system
- connect opacity tester (part of approved vendor equipment - SAE J1667 compliance not required)
- insert collection hose/sample head (sample probe at least 5mm from tailpipe wall)
- calibrate unit (automatic or manual process) initiate light duty diesel test application on Ontario test unit
- return to 50 kilometres/hour and proceed with the test
- if a stable reading is observed by the analyzer (less than 5% variation over 10 seconds), the average opacity reading over the last 10 seconds will be calculated and stored as the opacity result
- if the variability is greater than 5%, test will be repeated for an additional 30 seconds (second chance) and the average opacity reading over the last 10 seconds will be calculated and stored as the opacity result

Drive Clean LDV diesel program record keeping

A separate application on the test equipment will be used for diesel fuelled vehicle testing.

A computerized record keeping system will be used to ensure program integrity and allow easy monitoring of the LDV program by the Drive Clean Office. All official Drive Clean tests will be logged.

Vehicle data input

- Log date/vehicle/engine data and whether test or retest
- Perform test as above on secure analyzer
- Establish communications link with Drive Clean database and download test results)
- Print vehicle inspection report (VIR) (Pass/Fail)
- Pass - Licence renewal/ownership transfer can proceed
- Fail - Prioritize diagnostics for repair (Restricted air intake, fuel delivery quantity, injection timing, basic engine fault, etc.)
- Repair data forms issued
- Following repairs, retest vehicle
- Log repair information on repair data forms, store file copy at Drive Clean facility for two years
- Transfer final test result to secure computing platform
- Establish communications link with Drive Clean database and download test results and repair data information
- Print VIR (Pass/Conditional Pass/Fail)
- Pass - vehicle registration renewal and ownership transfer can proceed
- Conditional pass - vehicle registration renewal only can proceed
- Fail - repeat repair cycle

A test may be used that the Director considers equivalent.

**TABLE 11: Maximum emission standards
opacity test
Diesel Fuelled Light Vehicles**

Year	Greater Toronto Area and urban and commuter areas [maximum opacity]
1	2
1999 and 2000	10%
2001 and 2002	8%
2003 and 2004	6%
after 2004	4%

12. Opacity test

Diesel fuelled heavy vehicles

This section applies to diesel-fuelled vans, trucks and buses with GVWRs greater than 4,500 kg.

The maximum emission standard for a motor vehicle of a model year indicated in Column 1 of Table 12 is prescribed as the percentage opacity of the exhaust emissions specified opposite to it in Column 2 when the motor vehicle is tested using the opacity test for diesel fuelled heavy vehicles according to SAE J1667 snap acceleration smoke test procedure for heavy duty diesel powered vehicles, issued by the Society of Automotive Engineers, Inc. 1996-02, or a test that the Director considers equivalent.

**Table 12: Maximum emission standards
opacity test
Diesel Fuelled Heavy Vehicles**

Model year	Opacity
1990 or earlier	55%
1991 or later	40%

13. Submission of vehicle for testing

Section 13 of the Regulation consists of a notice for the submission of motor vehicles for testing (Form 1).

14. Service of order

Section 14 of the Regulation provides that a s. 18 *Environmental Protection Act* order may be served by leaving it with the driver of a motor vehicle.



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